ISSN 1948-5190 (online)

World Journal of *Gastrointestinal Endoscopy*

World J Gastrointest Endosc 2017 June 16; 9(6): 243-295

Published by Baishideng Publishing Group Inc

WJGE

World Journal of Gastrointestinal Endoscopy

Contents

Monthly Volume 9 Number 6 June 16, 2017

World Journal of Gastrointestinal Endoscopy
Volume 9 Number 6 June 16, 2017

Contents

NAME OF JOURNAL
World Journal of Gastrointestinal Endoscopy

ISSN
ISSN 1948-5190 (online)

LAUNCH DATE
October 15, 2009

FREQUENCY
Monthly

EDITORIAL OFFICE
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World Journal of Gastrointestinal Endoscopy
Baishideng Publishing Group Inc
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PUBLICATION DATE
June 16, 2017

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World Journal of Gastrointestinal Endoscopy

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World J Gastrointest Endosc 2017 June 16; 9(6): 263-266

DOI: 10.4253/wjge.v9.i6.263

ISSN 1948-5190 (online)

ORIGINAL ARTICLE

Retrospective Cohort Study

Endoscopic resolution and recurrence of gastric antral vascular ectasia after serial treatment with argon plasma coagulation

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Author contributions: Garg S contributed to study concept, IRB approval, and data analysis; Garg S and Aslam B drafted the initial manuscript and data entry; Nickl N critically and intellectualy revised the manuscript, and approved the final manuscript.

Institutional review board statement: This study was approved by University of Kentucky's Institutional Review Board.

Conflict-of-interest statement: All the authors have no conflict of interest related to the manuscript.

Data sharing statement: No additional data are available for sharing.

Manuscript source: Invited manuscript

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Received: December 8, 2016
Peer-review started: December 9, 2016
First decision: January 18, 2017
Revised: February 11, 2017
Accepted: April 23, 2017
Article in press: April 24, 2017
Published online: June 16, 2017

Abstract

AIM

To evaluate long-term endoscopic resolution and recurrence rate of gastric antral vascular ectasia (GAVE) after argon plasma coagulation (APC) treatment.

METHODS

This was an IRB-approved retrospective single center study that included patients endoscopically treated for GAVE between 1/1/2008 to 12/31/2014. The primary and secondary end points of the study were rate of endoscopic resolution of GAVE after APC treatment and recurrence rate of GAVE after endoscopic resolution, respectively. Endoscopic resolution of GAVE was defined as no endoscopic evidence of GAVE after treatment with APC. Recurrence of GAVE was defined as endoscopic reappearance of GAVE after prior resolution.

RESULTS

Twenty patients met the study criteria. Median age (range) of the patients was 59.5 years (42-74 years). GAVE was associated with underlying cirrhosis in 16 (80%) patients. Indications for initial esophagogastroduodenoscopy (EGD) included hematemesis and/or melena (9/20, 45%), iron deficiency anemia (6/20, 30%), screening or surveillance of varices (4/20, 20%), and occult gastrointestinal bleeding (1/20, 5%). The patients were treated with a total of 55 APC sessions (range 1-7 sessions). Successful endoscopic resolution of GAVE was

achieved in 8 out of 20 patients (40%). There was no correlation between number of treatment sessions and GAVE treatment success (*P* = NS). Recurrence of GAVE was noted on a subsequent EGD in 2 out of 8 patients (25%) with prior endoscopic resolution of GAVE. Median follow-up period for the study population was 627 d (range 63-1953 d).

CONCLUSION

Endoscopic resolution rate of GAVE was low (40%) with a 25% recurrence rate after treatment with APC. These rates suggest that APC treatment of GAVE may not be optimal in many circumstances.

Key words: Gastric antral vascular ectasia; Argon plasma coagulation

Core tip: Argon plasma coagulation (APC) has a good short-term success rate (> 80%) in improving symptoms related to gastric antral vascular ectasia (GAVE). However, GAVE related symptoms can recur in up to 50% of patients. This is the first study to evaluate resolution of GAVE after treatment with APC and its recurrence after successful treatment. The study showed a 40% resolution rate of GAVE after serial treatment with APC. The resolution of GAVE was not associated with number of APC sessions. GAVE was noted to recur in 25% of cases after successful resolution. These results suggest that APC may not be the best modality for treatment of symptomatic GAVE.

Garg S, Aslam B, Nickl N. Endoscopic resolution and recurrence of gastric antral vascular ectasia after serial treatment with argon plasma coagulation. *World J Gastrointest Endosc* 2017; 9(6): 263-266 Available from: URL: http://www.wjgnet.com/1948-5190/full/v9/i6/263.htm DOI: http://dx.doi.org/10.4253/wjge.v9.i6.263

INTRODUCTION

Gastric antral vascular ectasia (GAVE) is a well-defined clinical entity characterized endoscopically by prominent flat or erythematous streaks radiating in a spoke-like fashion from the pylorus to the antrum and pathologically by spindle cell proliferation in the mucosal blood vessels, intravascular fibrin thrombi and fibrinohyalinosis[1]. It is associated with portal hypertension or other systemic diseases like systemic sclerosis, and typically presents clinically as iron deficiency anemia and/or overt gastrointestinal (GI) bleeding[2]. In various case series, argon plasma coagulation (APC) has been shown to have > 80% success for treatment of GAVE related anemia or GI bleeding[1-6]. However, these results have not been uniformly confirmed; Boltin *et al*[7], for example, reported a lower success rate (25.8%) of APC in treating GAVE related anemia or GI bleeding at a mean follow up period of 46.8 mo. Similarly in a recent systemic review, Swanson *et al*[8] reported a 44%-50% failure rate of APC in the treatment of anemia or GI bleeding related to GAVE. They concluded that there is very low quality evidence for the use of APC in the treatment of GAVE. A possible reason for this observation is that APC is used for controlling GAVE related symptoms but not for complete eradication of GAVE itself. None of the prior studies have evaluated endoscopic resolution of GAVE after APC therapy. This study was undertaken to evaluate endoscopic resolution and recurrence rate of GAVE after therapy with APC.

MATERIALS AND METHODS

This was an IRB-approved retrospective study. Cases were identified by reviewing billing data for the period January 1, 2008 - December 31, 2014 to identify all patients who had an EGD (CPT codes 43200 - 43259 excluding 6 codes for EUS) at University of Kentucky Medical Center and with a billing diagnosis of GAVE (ICD-9 code 537.82). The diagnosis of GAVE was made endoscopically in each case.

The primary end point of the study was rate of endoscopic resolution of GAVE after APC treatment as seen on additional endoscopic exams subsequent to the index (first) exam which included treatment. The secondary end point of the study was GAVE recurrence rate after endoscopic resolution. Endoscopic resolution of GAVE was defined as no endoscopic evidence of GAVE after at least 1 treatment session with APC. Recurrence of GAVE was defined as endoscopic reappearance of GAVE on a subsequent EGD after successful resolution. Patients who did not undergo an APC session and at least one follow-up endoscopy, or had treatment of GAVE by a method other than APC were excluded from further analysis. The following information was collected from each patient's medical record: Demographics, etiology of GAVE, indication and date of endoscopy(s), endoscopic findings, adverse effects during endoscopy, follow-up period and death.

Treatment for GAVE at this institution did not follow a standardized protocol, but was instead directed by individual physician and patient preference according to the clinical circumstances. GAVE was treated with APC during the initial endoscopy when it was assessed to be the cause of patient's symptoms. Treatment of GAVE was repeated according to physician preference, generally every 4-8 wk; but not all patients underwent subsequent treatments. Procedures were done under appropriate sedation or anesthesia. APC treatment was performed using a high-frequency electrosurgical ERBE generator coupled to an argon gas delivery unit. The settings used for APC treatment were 20-60 Watts of power and 0.3 to 2 L/min of argon gas flow rate. In each APC session, affected areas were coagulated as much as

Table 1 Demographic features of patients with symptomatic gastric antral vascular ectasia *n* (%)

	Patients with cirrhosis (*n* = 16)	Patients without cirrhosis (*n* = 4)	*P* value
Median age (range) in years	59.5 (42-74)	62.5 (53-73)	0.51
Males	9 (56.3)	1 (25)	0.58
Caucasians	16 (100)	4 (100)	-
Indication for initial EGD			-
Upper gastrointestinal tract bleeding	7 (43.7)	2 (50)	
Iron deficiency anemia	5 (31.3)	1 (25)	
Esophageal varices screening or surveillance	4 (25)	-	
Follow up of arteriovascular malformations	-	1 (25)	
Median number of APC sessions (range)	2 (1-7)	2.5 (1-6)	0.66
Endoscopic resolution of GAVE	8 (50)	0	0.12
Recurrence of GAVE	2/8 (25%)	-	-

APC: Argon plasma coagulation; EGD: Esophagogastroduodenoscopy; GAVE: Gastric antral vascular ectasia.

possible.

Statistical analysis

Categorical data were described in fractions or percentages, and analyzed using Fischer's exact or χ^2 test depending on sample size. Continuous data were described as mean or median, and analyzed using *t* test or Wilcoxon rank-sum test depending on the distribution. Multivariate logistic regression was used to analyze the relationship between number of APC sessions and resolution of GAVE with APC. Two-sided *P* value of $\leqslant$ 0.05 was considered significant. The data were analyzed using STATA 13.1 (Statacorp® Texas).

RESULTS

A total of 45 patients with GAVE were identified by the initial screen for review. Twenty five patients were excluded from the final analysis: 8 patients did not get any treatment, 14 patients did not have a follow up EGD, and 3 patients had treatment of GAVE by other modalities. Twenty patients were included in the final analysis (Table 1). Median age (range) at the time of first EGD was 59.5 years (42-74 years). Ten patients were males (50%) and all the patients were Caucasians. GAVE was associated with underlying cirrhosis in 16 (80%) patients.

Indications for initial EGD were hematemesis and/or melena (9/20, 45%), iron deficiency anemia (6/20, 30%), screening or surveillance of varices (4/20, 20%), and occult gastrointestinal bleeding (1/20, 5%). A total of 55 APC sessions were done for the treatment of GAVE (2.75 sessions per patient, range 1-7 sessions). Successful endoscopic resolution of GAVE was achieved in 8 out of 20 patients (40%, 95%CI: 19%-64%). In all these 8 patients, GAVE was associated with underlying cirrhosis whereas none of the patients without cirrhosis had endoscopic resolution of GAVE. However, this difference was not statistically significant (*P* = 0.12). There was no correlation between number of treatment sessions and GAVE treatment success (*P* = 0.33, Table 2). In 2 out of 8 patients (25%, 95%CI: 3%-65%) who had endoscopic resolution of GAVE, it was noted again on a subsequent EGD that was performed for a different indication. Median follow-up period for the study population was 627 d (range 63-1953 d).

Table 2 Eradication success rate by number of argon plasma coagulation treatment sessions

No. of APC sessions	No. of total patients	Patients with GAVE resolution (%)	*P* value
1	7	2 (29)	0.33
2	5	2 (40)	
3	3	1 (33)	
4-7	5	3 (60)	
Total	20	8 (40)	

APC: Argon plasma coagulation; GAVE: Gastric antral vascular ectasia.

Portal hypertensive gastropathy (PHG) was noted in 3 out of 16 (18.75%) patients with GAVE and cirrhosis. GAVE resolution with APC treatment was noted in 2 of these 3 patients with PHG. PHG was not noted in patients with recurrence of GAVE after initial resolution. No endoscopy related adverse events were found during the study period. Three patients (15%) died during the follow-up period. Time to death ranged from 123-986 d. None of the deaths were related to the endoscopy or symptoms related to GAVE.

DISCUSSION

This is the first study to evaluate endoscopic resolution of GAVE and its recurrence rate after APC therapy. In this study, APC had a low success rate (40%) for endoscopic resolution of GAVE, with recurrence of GAVE seen in 25% of patients after documented endoscopic resolution on a subsequent EGD. Historically, APC has been reported to have > 80% success rate for treatment of anemia or GI bleeding related to GAVE. However, most of these case series did not evaluate endoscopic resolution or recurrence of GAVE[1-7].

Findings in this study support the low success rate of APC in the treatment of GAVE related anemia or GI bleeding as reported by Boltin *et al*[7] and Swanson *et al*[8]. It would be empirically expected that endoscopic appearance of GAVE would correlate with improvement in GAVE-related anemia or GI bleeding. Therefore, if the 70% rate of combined endoscopic non-resolution and recurrence seen in this series is correct, then APC would be expected to show suboptimal rates of improvement in GAVE-related symptoms.

There are several possible reasons for the low success rate of APC in endoscopic resolution of GAVE. GAVE varies significantly in morphology (flat *vs* nodular)

and severity (striped distribution in the antrum *vs* diffuse involvement of antral mucosa) between patients. APC may not work with similar effectiveness in all these situations. Additionally, the abnormal dilated capillaries and fibromuscular hyperplasia in GAVE extend to the lamina propria[9]. However, the coagulation effect of APC rarely (4.8%) ablates the entire thickness of lamina propria. Moreover, coagulation of the entire thickness of the lamina propria needs power of 90-Watts or more which is significantly higher than the usual power settings (30-80 W) used to treat GAVE [4,7,10].

There are some limitations of this study. The study has a small sample size. It is retrospective in nature and does not have a control group or a second intervention group to compare the outcomes with APC treatment. The study did not follow a defined program of consecutive APC sessions to achieve GAVE eradication, nor was there a defined surveillance protocol to search for recurrence. However, the lack of correlation between number of APC sessions and treatment success in this study suggests that this might not be an effective modality even in principle, or might require an excessive number of APC sessions. A prospective, protocol-driven study will be needed to resolve these questions.

In summary, APC may not be an effective therapy in long term for the treatment of symptomatic GAVE. Alternate therapies including radiofrequency ablation and/or banding should be evaluated in a prospective, randomized fashion against APC in order to determine the appropriate endoscopic approach for the treatment of symptomatic GAVE.

COMMENTS

Background

Argon plasma coagulation (APC) is the most widely used treatment method for gastric antral vascular ectasia (GAVE). However, a recent systematic review reported 44%-50% recurrence rate of symptoms related to GAVE after treatment with APC. None of the prior studies have evaluated endoscopic resolution of GAVE after therapy with APC.

Research frontiers

This is the first study to evaluate endoscopic resolution of GAVE after treatment with APC and its recurrence rate after successful treatment with APC therapy.

Innovations and breakthrough

The results of this study showed that serial treatment with APC was associated with only 40% resolution of GAVE as evaluated by endoscopy. Out of these 40% cases, GAVE was noted to recur during a subsequent esophagogastroduodenoscopy (EGD) in 25% of cases. The resolution of GAVE was not associated with number of APC sessions performed to treat GAVE.

Applications

The results of this study suggest that APC may not be an effective therapy in long term for the treatment of symptomatic GAVE. Alternate therapies including radiofrequency ablation and/or banding should be evaluated in a prospective, randomized fashion against APC in order to determine the appropriate endoscopic approach for the treatment of symptomatic GAVE.

Terminology

GAVE is a distinct clinical entity characterized endoscopically by prominent flat or erythematous streaks radiating in a spoke-like fashion from the pylorus to the antrum and pathologically by spindle cell proliferation in the mucosal blood vessels, intravascular fibrin thrombi and fibrinohyalinosis. EGD is a procedure used to examine the upper gastrointestinal tract (from esophagus to forth part of duodenum) using a flexible video endoscope. APC is a type of non-contact thermal therapy used during EGD to obtain hemostasis or tissue destruction. It involves infusion of argon gas through a catheter into the lumen of gastrointestinal tract. The gas is converted into plasma by passing electricity through the catheter. The plasma then conducts the electricity to the tissue to achieve hemostasis or tissue destruction. The catheter does not come into direct contact with the tissue.

Peer-review

The authors have looked into the outcomes of 20 patients with GAVE who underwent endoscopic APC treatment and concluded that endoscopic resolution rate of GAVE was low (40%) with a 25% recurrence rate after treatment with APC. The manuscript is interesting and provided some insight on the treatment of GAVE using APC.

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P- Reviewer: Chai FY **S- Editor**: Gong ZM **L- Editor**: A **E- Editor**: Wu HL

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